Citation:

Tavani A, Bosetti C, Negri E, Augustin LS, Jenkins DJ, La Vecchia C. Carbohydrates, dietary glycaemic load and glycaemic index, and risk of acute myocardial infarction. *Heart.* 2003; 89(7):722-6.

PubMed ID: 12807839

Study Design:

Case-Control Study

Class:

C - Click here for explanation of classification scheme.

Research Design and Implementation Rating:

NEUTRAL: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

To assess the relation between selected carbohydrate foods, dietary glycemic load and glycemic index, and the risk of non-fatal acute myocardial infarction in a population with high intake of refined carbohydrates.

Inclusion Criteria:

- Cases: non-diabetic subjects with a first episode of non-fatal acute myocardial infarction, defined according to the World Health Organization criteria
- Controls: from the same geographical area, admitted to the same hospitals for a wide spectrum of acute conditions unrelated to known or potential risk factors for acute myocardial infarction

Exclusion Criteria:

Cases and controls reporting a diagnosis of diabetes were excluded.

Description of Study Protocol:

Recruitment

Hospital-based study conducted between 1995 and 1999. Cases were patients admitted to a network of teaching and general hospitals in the area.

Design: Case-control study

Blinding used (if applicable): not applicable

Intervention (if applicable): not applicable

Statistical Analysis

- Multivariate odds ratios and 95% confidence intervals were obtained by unconditional multiple logistic regression models
- Tests for trend were based on the likelihood ratio test between the models with and without a linear term for each variable of interest

Data Collection Summary:

Timing of Measurements

Information was collected by interviewer-administered structured questionnaires during hospital stay.

Dependent Variables

- Risk of myocardial infarction

Independent Variables

- Intake of selected carbohydrate foods
- Dietary glycemic load and glycemic index derived from international tables and from Italian sources for a few local recipes
- Dietary information based on a food frequency questionnaire
- Intakes were computed using an Italian food composition database

Control Variables

- Energy intake
- Age
- Sex
- Education
- BMI
- Cholesterol concentrations obtained from clinical records
- Tobacco smoking
- Alcohol drinking
- Physical activity
- Hyperlipidemia
- Diabetes
- Hypertension
- Family history of ischemic heart disease in first degree relatives

Description of Actual Data Sample:

Initial N: 507 cases (378 men, 129 women), 478 controls (297 men, 181 women)

Attrition (final N): 433 cases, 448 controls after those with diabetes were excluded.

Age:

- Cases: median age 61 years, range 25 - 79 years
- Controls: median age 59 years, range 25 - 79 years

Ethnicity: not reported

Other relevant demographics:

Anthropometrics

Location: Milan, Italy

Summary of Results:

Key Findings

- Compared with patients in the lowest tertile of intake, the multivariate odds ratio for those in the highest tertile was 1.00 for bread, 1.27 for pasta and rice, 1.38 for soups, 0.78 for potatoes, 0.97 for desserts, and 1.00 for sugar
- The odds ratio for the highest tertile of score was 1.08 for glycemic load and 1.38 for glycemic index
- None of the estimates was significant
- A significant association with acute myocardial infarction risk was found for glycemic index in patients aged >60 years (odds ratio = 1.81, 95% confidence interval: 1.07 - 3.07 for the highest tertile of score compared with the lowest) and in those with a BMI > 25 (odds ratio = 2.02, 95% confidence interval: 1.21 - 3.34).

Odds Ratios and Corresponding 95% Confidence Intervals According to Energy-Adjusted Glycemic Index and Glycemic Load Among 433 Non-Diabetic Cases of Acute Myocardial Infarction and 448 Controls

Variables	Tertile of Score - I	Tertile of Score - II	Tertile of Score - III	P for trend
Glycemic Index, Cases/Controls	124/150	148/148	161/150	
Glycemic Index, Upper Limit	72.8	76.8		
Glycemic Index, Odds Ratio (95% CI)	1	1.35 (0.93 - 1.98)	1.38 (0.95 - 2.00)	2.70 (0.10)
Glycemic Load, Cases/Controls	144/150	133/148	156/150	
Glycemic Load, Upper Limit	204.8	237.8		
Glycemic Load, Odds Ratio (95% CI)	1	0.99 (0.68 - 1.46)	1.08 (0.73 - 1.60)	0.16 (0.69)

Author Conclusion:

Although no overall relation with glycemic index or glycemic load and acute myocardial infarction risk was found in this Italian population, there was a positive association between glycemic index and acute myocardial infarction in subgroups most likely to have insulin resistance - the older and more overweight subjects. More studies in these high risk subgroups are needed to confirm these observations and to identify foods or classes of foods with specific effects.

Reviewer Comments:

Cases and controls were not matched. Authors note the following limitations:

- *Glycemic index estimates have some limitations, as some of them derive from small samples and their variability is unclear*
- *Relatively small sample size, which is inadequate to investigate moderate associations in subgroups or interactions*

Research Design and Implementation Criteria Checklist: Primary Research

Relevance Questions		
1.	Would implementing the studied intervention or procedure (if found successful) result in improved outcomes for the patients/clients/population group? (Not Applicable for some epidemiological studies)	Yes
2.	Did the authors study an outcome (dependent variable) or topic that the patients/clients/population group would care about?	Yes
3.	Is the focus of the intervention or procedure (independent variable) or topic of study a common issue of concern to nutrition or dietetics practice?	Yes
4.	Is the intervention or procedure feasible? (NA for some epidemiological studies)	Yes

Validity Questions		
1.	**Was the research question clearly stated?**	Yes
1.1.	Was (were) the specific intervention(s) or procedure(s) [independent variable(s)] identified?	Yes
1.2.	Was (were) the outcome(s) [dependent variable(s)] clearly indicated?	Yes
1.3.	Were the target population and setting specified?	Yes
2.	**Was the selection of study subjects/patients free from bias?**	Yes
2.1.	Were inclusion/exclusion criteria specified (e.g., risk, point in disease progression, diagnostic or prognosis criteria), and with sufficient detail and without omitting criteria critical to the study?	Yes

2.2.	Were criteria applied equally to all study groups?	Yes
2.3.	Were health, demographics, and other characteristics of subjects described?	Yes
2.4.	Were the subjects/patients a representative sample of the relevant population?	Yes
3.	**Were study groups comparable?**	No
3.1.	Was the method of assigning subjects/patients to groups described and unbiased? (Method of randomization identified if RCT)	Yes
3.2.	Were distribution of disease status, prognostic factors, and other factors (e.g., demographics) similar across study groups at baseline?	N/A
3.3.	Were concurrent controls used? (Concurrent preferred over historical controls.)	Yes
3.4.	If cohort study or cross-sectional study, were groups comparable on important confounding factors and/or were preexisting differences accounted for by using appropriate adjustments in statistical analysis?	N/A
3.5.	If case control or cross-sectional study, were potential confounding factors comparable for cases and controls? (If case series or trial with subjects serving as own control, this criterion is not applicable. Criterion may not be applicable in some cross-sectional studies.)	No
3.6.	If diagnostic test, was there an independent blind comparison with an appropriate reference standard (e.g., "gold standard")?	N/A
4.	**Was method of handling withdrawals described?**	Yes
4.1.	Were follow-up methods described and the same for all groups?	Yes
4.2.	Was the number, characteristics of withdrawals (i.e., dropouts, lost to follow up, attrition rate) and/or response rate (cross-sectional studies) described for each group? (Follow up goal for a strong study is 80%.)	Yes
4.3.	Were all enrolled subjects/patients (in the original sample) accounted for?	Yes
4.4.	Were reasons for withdrawals similar across groups?	Yes
4.5.	If diagnostic test, was decision to perform reference test not dependent on results of test under study?	N/A
5.	**Was blinding used to prevent introduction of bias?**	Yes
5.1.	In intervention study, were subjects, clinicians/practitioners, and investigators blinded to treatment group, as appropriate?	N/A

5.2.	Were data collectors blinded for outcomes assessment? (If outcome is measured using an objective test, such as a lab value, this criterion is assumed to be met.)	Yes
5.3.	In cohort study or cross-sectional study, were measurements of outcomes and risk factors blinded?	N/A
5.4.	In case control study, was case definition explicit and case ascertainment not influenced by exposure status?	Yes
5.5.	In diagnostic study, were test results blinded to patient history and other test results?	N/A
6.	**Were intervention/therapeutic regimens/exposure factor or procedure and any comparison(s) described in detail? Were interveningfactors described?**	Yes
6.1.	In RCT or other intervention trial, were protocols described for all regimens studied?	N/A
6.2.	In observational study, were interventions, study settings, and clinicians/provider described?	Yes
6.3.	Was the intensity and duration of the intervention or exposure factor sufficient to produce a meaningful effect?	N/A
6.4.	Was the amount of exposure and, if relevant, subject/patient compliance measured?	N/A
6.5.	Were co-interventions (e.g., ancillary treatments, other therapies) described?	N/A
6.6.	Were extra or unplanned treatments described?	N/A
6.7.	Was the information for 6.4, 6.5, and 6.6 assessed the same way for all groups?	N/A
6.8.	In diagnostic study, were details of test administration and replication sufficient?	N/A
7.	**Were outcomes clearly defined and the measurements valid and reliable?**	Yes
7.1.	Were primary and secondary endpoints described and relevant to the question?	N/A
7.2.	Were nutrition measures appropriate to question and outcomes of concern?	Yes
7.3.	Was the period of follow-up long enough for important outcome(s) to occur?	N/A
7.4.	Were the observations and measurements based on standard, valid, and reliable data collection instruments/tests/procedures?	Yes
7.5.	Was the measurement of effect at an appropriate level of precision?	Yes
7.6.	Were other factors accounted for (measured) that could affect outcomes?	???
7.7.	Were the measurements conducted consistently across groups?	Yes

8.	**Was the statistical analysis appropriate for the study design and type of outcome indicators?**		Yes
	8.1.	Were statistical analyses adequately described and the results reported appropriately?	Yes
	8.2.	Were correct statistical tests used and assumptions of test not violated?	Yes
	8.3.	Were statistics reported with levels of significance and/or confidence intervals?	Yes
	8.4.	Was "intent to treat" analysis of outcomes done (and as appropriate, was there an analysis of outcomes for those maximally exposed or a dose-response analysis)?	N/A
	8.5.	Were adequate adjustments made for effects of confounding factors that might have affected the outcomes (e.g., multivariate analyses)?	Yes
	8.6.	Was clinical significance as well as statistical significance reported?	Yes
	8.7.	If negative findings, was a power calculation reported to address type 2 error?	N/A
9.	**Are conclusions supported by results with biases and limitations taken into consideration?**		Yes
	9.1.	Is there a discussion of findings?	Yes
	9.2.	Are biases and study limitations identified and discussed?	Yes
10.	**Is bias due to study's funding or sponsorship unlikely?**		Yes
	10.1.	Were sources of funding and investigators' affiliations described?	Yes
	10.2.	Was the study free from apparent conflict of interest?	Yes